Who, why, when?

AS THE HUMAN GENOME RESEARCH PROJECT NEARS ITS END, PROFESSOR MARK HENAGHAN REVIEWS ITS FINDINGS.

UNTIL RECENTLY, parents who carried the genes for a range of heritable conditions such as Huntington's disease, haemophilia and cystic fibrosis had no way of knowing if they might be passing those conditions on to their children.

Many agonised over whether to have children or, in the case of haemophilia, using IVF so they could discard all male embryos, even though not all would have the condition.

The exponential increase in knowledge about the human genome and the ability to genetically screen for many severe inherited diseases has changed that.

But it has also raised many ethical, medical, cultural and legal issues around whether, how and to what extent human genome-based technologies should be regulated, prompting the New Zealand Law Foundation to step up with sponsorship for the University of Otago-led Human Genome Research Project (HGRP).*

The result has been a three-year, multidisciplinary investigation into the issues surrounding emerging human genetic technologies, drawing on New Zealand and overseas expertise to produce a series of reports totalling some 1,300 pages, thus far.

Those reports have covered topics ranging from the pre-implantation genetic diagnosis (PGD) of implant embryos, newborn screening and the genetic testing of children, to the issues surrounding community genetics and the need for a Māori ethical framework for research relating to Māori health.

Project leader and Dean of Otago's Law Faculty Professor Mark Henaghan says the key concerns revolve around how humankind could misuse genetic knowledge.

"Some feared that we would be able to predetermine and design babies, predetermine what illnesses people were going to get, and predetermine whether people were pre-inclined to certain crimes and those sorts of things," he says.

"Many people felt that this information could be misused. It could be misused by employers, it could be misused by governments and misused by people who wouldn't want to have anything to do with you because of your genetic make-up.

"At the same time – and this is the reason I got involved – one could also see the tremendous good that could come from it," says Henaghan. "If there is one lesson I have learnt from this project, it is just how much potential for good the flow-on from this discovery has in terms of being able to find things like genes for cancers, for example. If they find genes that predispose people to certain diseases then they can do something about it early on."

Henaghan says the HGRP's reports have progressed through the lifespan, starting with PGD and the screening of implant embryos for genetic disorders such as haemophilia, Huntington's disease and cystic fibrosis.

"PGD means people with genetic disorders in their family are able to have a child without the burden or the fear," he says. "For example, there is a one in two chance someone with Huntington's disease will have a child with the condition.

"I think anyone in that situation will say it's wonderful that they are now able to have a choice – that they are able to have a child that is free from the disease. Those sorts of things have helped me understand that these discoveries have the potential to do more good than harm."

Fears of genetic knowledge being used to create the perfect baby won't come to fruition, he says. "People wouldn't want

Photo: Alan Dove

Professor Mark Henaghan:
"… these discoveries have the potential to do more good than harm."

to do that – it's not the way people work. Besides, I think that the complex interaction between genes and the environment means that you would never get it right anyway."

But, as one of the HGRP's more recent reports found, parents using PGD may also end up with some unwanted information about themselves.

"Say, for example, one of your grandparents had Huntington's disease, you've probably got a one in two chance of having it – but you probably don't want to know that," says Henaghan. "On the other hand they want to eliminate the risk of a future child having it, so they use what is called exclusion testing which tells them whether a particular embryo is free of the disease without them knowing what their own make-up is," he says.

"Knowing at the age of 25 that in 15 or 20 years' time they could develop this awful, debilitating disease would be too much for some people to bear and would lower the quality of their lives."

The HGRP has therefore recommended the use of exclusion testing for such situations.

Newborn testing raised a different range of issues. Henaghan says there are conditions where it can make a difference to quality of life.

"But should parents be able to test for conditions which they can't do much about, for example, Huntington's, and be stuck with the knowledge even though they can't do much about it? We came down with the view that parents shouldn't be encouraged to test their children in this sort of situation," he says. "Their children might want to make the choice themselves when they get to 18 or 19, knowing that there is Huntington's disease in the family history."

On the other hand they found, for example, testing for susceptibility to diabetes could be very helpful for parents because they can do something about it, such as adjusting diet and lifestyle.

"In the end, if more people take responsibility for their health then it takes the burden off everyone."

Looking at it from a legal perspective, Henaghan believes New Zealand law is generally coping well with the changing technology. Our privacy laws are reasonably modern and the Human Assisted Reproductive Technology (HART) Act provides good processes.

"I think the danger in this area is to over-regulate. You can try to eliminate all risks, but, if you do that, you stifle the ability of people to make choices.

"There is the potential to do that with PGD. If we over-regulate and have doctors and ethics committees making the decisions then you have to ask 'What more do they know than the parents?' They're not the ones who will be bringing up the child."

Henaghan says that also extends to so-called "saviour siblings" – where a child with a severe life-threatening condition can be saved if a sibling is born with compatible genetic tissue, after being selected by PGD.

"It seems to me that should be a parental choice. All they are doing is choosing a child with a particular blood group and genetic make-up. Some people see that as using a child as an instrument, but we need to trust parents to do things which both children will benefit from," he says.

"Do you put the burden on the individual choosing to show there's no harm – which I think is impossible because everything has the potential for harm – or do you put the burden on society and say 'Unless you can show clear harm you shouldn't take choice away from people?' I think that's where we've gone – down the second track."

Henaghan says trying to eliminate all harm before you proceed will stifle the ability of society to grow.

"You can't eliminate all harm. New Zealanders have always been risk-takers and that's always been one of our strengths. We can only forge ahead in a knowledge society if we are prepared to take those risks from time to time.

"Generally, I think you can show the benefits outweigh the harms, because they are only potential harms, the actual benefits are very clear – the child will be well. The harms

*The New Zealand Law Foundation

THE NEW ZEALAND Law Foundation established the Human Genome Research Project after identifying the relative absence of legal and policy analysis in New Zealand around the rapidly emerging issues from human genetic technologies. Otago's Faculty of Law was selected in 2002 to lead a multidisciplinary research team involving international collaborators.

The New Zealand Law Foundation is an independent charitable trust that provides grants for legal research and public education on legal matters. As such, it is the only funder of "pure" legal research in New Zealand – other legal research funding is tied to public policy development.

In addition to its grants' programme, the foundation also awards annually the International Research Fellowship, New Zealand's premier legal research award.

> New Zealand law is generally coping well with the changing technology. Our privacy laws are reasonably modern and the Human Assisted Reproductive Technology (HART) Act provides good processes. – Professor Mark Henaghan

(the saviour sibling might be used) are just predictions and possibilities – they are not actualities."

Henaghan has come to realise that, for many conditions, it is not just the genetic make-up; it's the environment and the social conditions – genes don't predetermine everything.

"So it hasn't dehumanised us. There was a fear that we would just be the sum of our genetic make-up as opposed to the sum of our environment, our social interactions – all those other things," he says.

"This project has been an opportunity to show the wider community that this technology has the potential to bring very real benefits and is not just science fiction."

From next year research in this area will come under the new New Zealand Law Foundation Chair in Emerging Technologies which has been funded by a $1.5 million sponsorship from the foundation, as well as support from the University of Otago's Leading Thinkers initiative. In a first for New Zealand, the new chair will lead the Centre for Law and Policy in Emerging Technologies and guide projects tackling legal issues, regulations and policies that face upheaval because of fast-paced developments in technology.

Mark Wright

New reports pending

TWO FURTHER REPORTS, on patents and pharmacogenetics, are due out later this year as the Human Genome Research Project moves towards its final report release early next year.

Pharmacogenetics involves the tailoring of drugs to meet an individual's genetic make-up and Henaghan says, that while it sounds very effective, this so-called personalised medicine is still a long way off.

"There are some downsides to it, in the sense that drugs may be tailored to meet certain genes because they are easy, so people in that gene pool will have drugs made for them. But, for those on the periphery, it is simply too expensive to produce drugs specifically for that group.

"People may think that the drugs will simply work and will forget about environmental and other factors," he says.

"While I think progress will happen in that area, again I don't think it's going to be something that drug companies are going to be rushing into. It is hard enough to produce a drug for a large population – it costs millions. So I think those things are a slight inhibition to being able to go ahead."

A report will also be released on patents on experimental techniques and tests used in genetic research.

Henaghan says there is the danger of people wanting to take a patent over that test, making it too costly to have it available as a diagnostic tool.

"Generally our research of health-care providers and researchers showed that people weren't constrained from using these things because of the cost," he says. "Overseas patent holders are not currently insisting on high premiums and some are not enforcing patents in New Zealand.

"It isn't inhibiting people's ability to access things, so they can keep up with what's going on in this area without the prohibitive costs of licensing.

"At the moment, though, it is good news for a small country like New Zealand that our scientists can adapt tools from overseas and access them here without prohibitive costs."

Henaghan says one option would be to have a research exemption in the Patents Act so researchers can use the knowledge from overseas research to develop tools here.

"There is no immediate need for that, but it would be a good safety net."